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ABSTRACT

This paper deals with the impact of limited special programs on the implementation of new curricula in Germany. The specific case of environmental education is addressed and shows the impact of special programs on selected areas of the implementation process. The study examines aspects of quantity and quality of environmental education conducted by teachers and schools that participated in special programs compared to those teachers and schools that did not. Quantitative and qualitative aspects are discussed. Special attention is paid to the development of environmental education in everyday school life since educational practice does not automatically follow inclusion of topics in syllabi and curricula. The paper assesses that the depiction of German environmental education in governmental publications and regulations seems to be much brighter than when it is viewed on the basis of empirical findings concerning school reality. (EH)

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by Horst Rode

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The impact of special programs on the implementation of new curricula: The case of environmental education in Germany

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Scope of paper

This paper deals with the impact of limited special programs on the implementation of new curricula. In Germany, such programs are used to test new curricular contents and procedures as well as to foster implementation and evaluation of new curricula and subject areas. Prominent examples for subject areas which were recently covered by such programs are the use of information technology and environmental education.

This paper takes the case of environmental education and shows the impact of special programs on selected areas of the implementation process, i.e. aspects of quantity and quality of environmental education conducted by teachers and schools that participated in special programs compared to those teachers and schools that did not. Quantitative aspects include variables such as number of environmental courses per schoolyear and time spent on environmental issues. Qualitative aspects primarily focus on the inclusion of methodological key elements identified by different authors (e. g. HINES et al., 1987; RAMSEY, 1993), such as teaching action skills (action orientation), conveying knowledge about ecological concepts (systems orientation), analyzing environmental problems (problem orientation), and use of issue specific materials. The degree of inclusion of these aspects can be viewed as an indicator for success and depth of the implementation process.

Special attention will be paid to the development of environmental education in everyday school life. The inclusion of environmental topics in syllabi and curricula does not mean that changes in educational practice follow automatically. The depiction of German environmental education in governmental publications and regulations seems to be much brighter than it is when seen on the basis of empirical findings concerning school reality.

Innovation Processes in the German School System

Usually, innovation processes in the German school system take a quite long time. New ideas or scientific and technological achievements need up to 10 years to become a part of everyday school life - if at all. The reasons are manyfold. A major reason are the fragmented decision making processes. The German Constitution allocates the decision making power for educational issues completely to the Laender (i.e. the 16

states that comprise Germany). Within a common framework (length of school attendence, exam requirements) there are differences between the school system in each of the Laender. Two examples: In Berlin the elementary school extends to the 6th grade instead of 4th grade in the remaining 15 Laender. In the five New Laender (which were parts of the German Democratic Republic prior to the fall of Berlin Wall) do not all school forms exist. Each Land has its own curricula, syllabi, teacher training programs and facilities, textbook preferences etc. On the other hand, the Federal Government only has indirect influence primarily by allocating federal funds and promoting new ideas and developments that seem to be desirable for the educational system. Additionally, schools and teachers are free to choose teaching methodologies. There is not much moderation or cooperation between schools - even if they are located at the same city.

A system like this needs coordination. This function is fulfilled by the conference of the ministers for education of the Laender (Kultusministerkonferenz) and - with the inclusion of the federal level - by the commission for eduaction and research (Bund-Laender-Kommission fuer Bildungsplanung und Forschungsfoerderung, BLK). In these commissions, new educational ideas and developments are discussed in order to get common grounds for the decisions to be taken on Laender level. The result of the discussions are recommendations for the further handling of new ideas and developments in the educational system. The Laender usually follow the recommendations of these commissions.

When a new idea, development or problem is viewed as crucially important for the society and therefore recommended as a new subject area in schools, special programs are initiated - equally funded by federal and state money. In the framework of these programs curricula and class materials are developed and evaluated, different methodological approaches are tested, and special teacher training is offered.

Special programs - the German word is „Modellversuch" and unfortunately not transferable into English - usually include a limited number of schools and/or teachers that receive extra funding and training. Funding can be extra money, euipment or the possibility for teachers to allocate some regular working time (usually 2 or 4 hours a week) for program purposes such as organisation, concept development and evaluation. There are many variations in special programs: They may include entire schools, some individual teachers of several schools or only individual teachers. There my be cooperation with public and private institutions out of school. Special programs extend over a limited period of time, usually not more than four or five years. At the end of a special program reports about the outcomes are written. When these reports are favorable it is very likely that the new idea or subject area will be introduced in schools on a large scale level.

Background

Following the outcomes of two international conferences in Tbilisi 1977, and Munich 1978, environmental education entered the center of interest of educational politics in

Germany. In 1980, the governments of the German Laender and the federal government decided to foster development and implementation of curricula related to environmental education in schools (KULTUSMINISTERKONFERENZ, 1992).

In 1985, a first nationwide empirical survey dealing with environmental education was conducted (EULEFELD et al., 1988, 1990). Key questions of this research were find to find out to which extent environmental topics had become part of lessons and instructions in schools, and how environmental education was conducted in day-to-day school practice. The results of this survey indicated that environmental education played a minor role in school practice: A mean time of only four hours per year was spent on environmental topics; only a small minority of teachers conducted environmental education in a methodologically sound way.

To improve the overall situation of environmental education and to give new impulses for the implementation of environmental curricula, several Laender set up special programs for environmental education in cooperation with and co-funded by the federal government. Programs started in 1987 in the western parts of Germany; the new Laender followed after the German reunification in 1990. Most of the programs terminated in the western parts in 1990 or 1991, and 1993 in the eastern parts. During the last three years, there have been efforts in all Laender to foster environmental education by rewriting curricula under environmental viewpoints and building support structures (e.g. centers for environmental education out of schools). These structures are still too new to have a measurable impact on quantity and quality of environmental education.

Selected schools and teachers were given special opportunities for in-service training, discussion of environment related teaching methods and experiences with colleagues from other schools and experts, and additional funding (e.g. travel expenses, and equipment). The special programs dealt with in this paper primarily include entire schools in three of the Laender and some individual teachers in one Land.

Hypotheses Tested

The key hypothesis tested in this paper is: Special government programs for environmental education significantly contribute to improvements in school practice, quantitatively and qualitatively: More time is spent and more topics are adressed by those teachers and schools participating in special programs than by those teachers and schools not participating. The increased efforts of governments, teachers, and schools during recent years has led to a more important role of environmental education in curricula and in the classroom. The special programs contributed to a stabilization of environmental education which is reflected by the comparison of the 1991 and 1996 surveys.

Data and Methods

This paper uses data collected in a nationwide survey in 1991 and data form a second nationwide survey among 9th grade teachers and students collected in 1996 (cf. EULEFELD et al., 1993;). In 1991, 1096 West German teachers from all grades and subjects

returned completed questionnaires. 780 of these 1096 teachers reported to have included environmental issues in their courses and lessons. 145 of the 780 teaching environmental issues did this at schools participating special programs.

In 1996, 467 teachers from the 9th grade returned completed questionnaires. 260 (55.7%) included environmental issues. A subset of 136 questionnaires came from teachers who taught environmental issues at ecologically well profiled schools, i.e. schools with a wide variety of ecology related features such as modern heating systems, well insulated buildings for energy saving, facilities for sorting trash, biotopes on school grounds, good connections to public transportation etc. 77 (56.6%) of these 136 teachers included environmental topics in their courses. It should be noted that a comparison between the 1985 and 1991 surveys on one hand and the 1996 survey has limitations because of the different samples.

Five groups of respondents will be compared: The participants of the 1985 survey, both teacher groups from the 1991 survey, and the two teacher groups responding to the questions of the 1996 survey. Techniques such as multiple linear regression and latent class analysis (LCA) are used to assess the predictive power of special governmental programs for environmental education (in comparison to other independent variables), and to identify qualitative differences in conducting environmental education between the four groups of respondents. In all three surveys, the conduct of environmental issues in courses and classes was measured by using the eight above mentioned indicators. Table 1 shows all groups and sample sizes.

Type of sample	1985 N=	1991 general N=	1991 special programs N=	1996 normal schools N=	1996 ecologically profiled schools N=
Total	379	935	161	331	136
with environmental education	*379*	*635*	*145*	*183*	*77*
without environmental education	-	300	16	148	59

Table 1: Sample sizes of teacher groups compared in this paper(Note: For further calculations the numbers in italics are relevant)

Treatment of environmental issues in lessons and courses was measured by eight indicators, which were also used in the 1991 and 1996 surveys:

SitOr	Situation orientation (teaching about local environmental problems o local aspects of global problems)
TpMat	Topic related paper materials (using self administered working sheets, articles from environmental magazines etc.)
ExpMat	Experiment materials (using materials for experiments and analysis, e.g. testing the degree of water pollution)

NatAO	Natural scientific action orientation (caring for biotopes, taking measurements in nature, watching nature etc.)
SocAO	Social scientific action orientation (working with people out of school, pupils conduct surveys about local problems, documentation of environmental projects
SysOr	Systems orientation (teaching about systems aspect of environmental problems, e.g. interactions of different components of ecosystems)
NatPO	Natural scientific problem orientation (discussing aspects of environmental problems from the viewpoint of natural sciences)
SocPO	Social scientific problem orientation (discussing aspects of environmental problems from the viewpoint of social sciences, e.g. the conflict between economy and ecology)

To reduce complexity of data and uncover response structures Latent Class Analysis (LCA) was used (cf. ROST, 1988). LCA allows to build groups of respondents by using their response patterns. Unlike other multivariate statistics, e.g. factor analysis, individuals rather than variables are grouped. Each response pattern describes an approach of adressing environmental issues and represents an individual teacher. Therefore it is possible to use latent class membership as categorial data for further statistical analysis. Besides this qualitative aspect, LCA also yields addditional quantitative data. For each person parameters are calculated that describe the likelihood of an individual to belong to an assigned latent class. These metric data can also be used for further statistical analysis.

Findings

A first important indicator for innovations are changes in the organisation of lessons and courses. Usually, the type of organisation has an impact on overall time spent with a topic and the scope of teaching methods employed. For environmental education longer consecutive time spans are desirable.

Table 2 reveals that in 1985, only 12.9% of environmental courses were conducted in consecutive longer time spans (e.g. using a whole school day for an excursion). 87.1% were conducted in single or double classroom hours. In 1991, the picture had changed. 21.4% of the teachers interviewed reported to have used longer time spans, in schools participating in special programs this figure increased to 39.6%. In 1996, 24.6% of the teachers teaching environmental courses at schools without special ecological profile used longer consecutive time periods. At schools with a well developed ecological profile the figure was 31.6%. Between 1985 and 1991, there have been significant changes in the organization of environmental courses. Teachers participating in special programs did even more. From 1991 to 1996 there is a consolidation with a slight overall improvement. After the termination of the special programs teachers obviously did not turn back to „old fashioned" organizational patterns.

	1985	1991 schools not partici-pating in sp. programs	1991 special programs	1996 schools without special ecol. profile	1996 ecologically profiled schools
single or double lesson hour	87.1%	78.6%	60.4%	75.4%	68.4%
extended time period > 2hrs	12.9%	21.4%	39.6%	24.6%	31.6%

Table 2: Class organization among the five populations.

These findings are reflected in the average time spent on environmental issues in regular school time: In 1985, there were only six hours spent in the classroom. In 1991, at schools not participating in special programs 7.5 hours were used for teaching environmental topics. Teachers at schools participating scored considerably higher with 9.1 hours spent. In 1996, 6.6 hours were spent on environmental issues - at least in the 9th grade.

Significant changes in the time budget were also visible when comparing the time spent on environmental issues by student out of regular school time(cf. table 3). In 1985, 70% of the teachers reported no activities outside the school at all. 27% told us that their students spent 3 to 5 hours per schoolyear outside school when dealing with environmental problems. In 1991, 49.1% of teachers at schools not participating in government programs and 36.8% teachers at schools participating still reported no out-of-school activities. 32.2% resp. 35.4% reported 3 to 5 hours, 5.7% resp. 8.8% 6 to 10 hours, and 2.6% resp. 7.6% even more than 20 hours per schoolyear spent on out-of-school activities related to the environment.

Number of hours spent out of school	1985	1991 schools not participating in special programs	1991 schools part-icipating in special programs
0	70.0%	49.1%	36.8%
3-5	27.0%	32.2%	35.4%
6-10		5.7%	8.8%
20 and more		2.6%	7.6%
no answer	3.0%	10.4%	11.4%

Table 3: Out-of-school time spent on environmental issues (Note: Data for 1996 are not available)

A second indicator for the progress in curriculum implementation is a growing quality of classes and courses. In 1985, only 15% (type 1) of 379 teachers interviewed taught students about the environment according to the principles of action orientation, systems orientation, and problem orientation in their lessons; 46.5% (type 2) of the teachers conducted environmental lessons in a verbal and problem-oriented way;

38.5% (type 3) did not meet the criteria of a sound environmental education in school (see fig. 1).

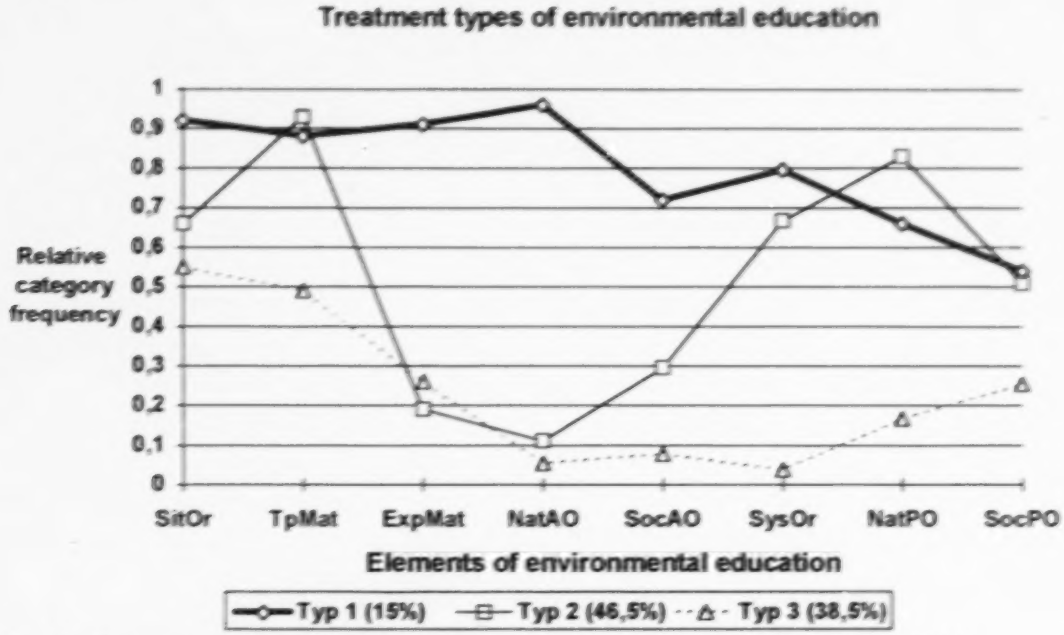

Fig. 1: Treatment types of Environmental education (EULEFELD et al., 1988)

Until 1991, the quality of environmental education changed significantly. LCA was used to calculate type memberships and sizes. First, all 780 teachers conducting environmental education were put into the LCA process. The results are the curves shown in fig. 2. In a second step, the frequency distribution of the types was calculated within each of the two subpopulations. With the exception of situation orientation and use of equipment for experiments (both were surveyed with different instruments than in the first survey, 1985), many more teachers followed the guidelines of environmental education than in 1985. The share of respondents fitting the guidelines best (type 1) increased up to 40.4% in schools not participating in special programs; in those schools that did participate, the share of type 1 teachers even showed a remarkable 54.5%.

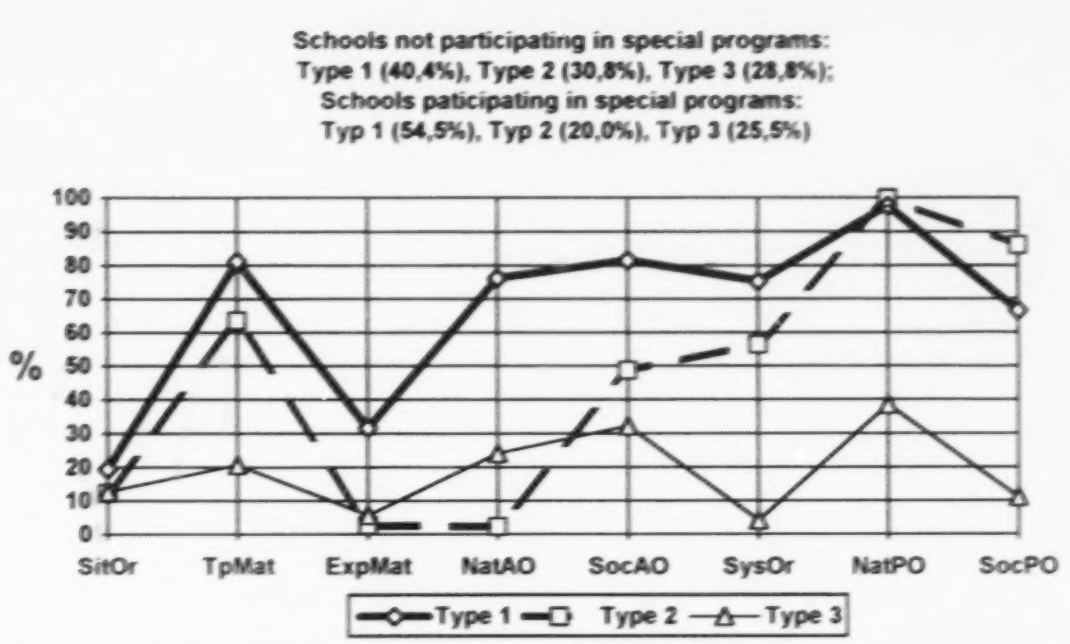

Fig. 2: Treatment types of environmental education, 1991

This seems mostly due the improved conditions provided by special programs. A major explaining factor is inservice training. Only 16.0% of theachers at schools not participating attended inservice training about environmental issues. At schools participating in special programs there were 42.9% of all teachers who reported their attendance in inservice training courses related to environmental topics. The crucial importance of inservice training is illustrated in fig. 3. The dependent variable „treatment type" was operationalized as the likelihood for respondents to be assigned to the latent class that characterized type 1.

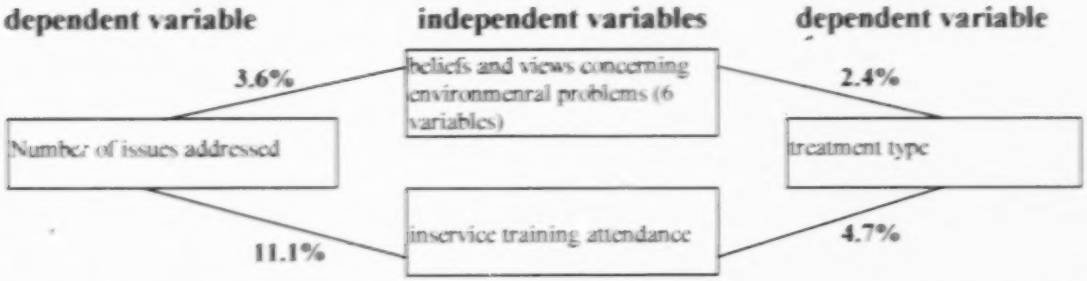

Fig. 3: Percentages of variance of environmental education activities explained by various independent variables (multiple linear regression).

With inservice training, the number of environmental issues adressed in classes and courses increased significantly. There was also a clear relationship between quality of treatment and inservice training. There was also a relatively strong correlation between the general support provided by special programs and the quality of environmental education ($r=.26$, $p<.05$).

From 1991 to 1996, there seems to be a consolidation in the quality of environmental education at German schools. The results presented in fig. 4 were calculated the same way as the results in fig. 2. The picture does not differ much from that of 1991, with a slight decline in quality which may be characteristic for a phase of consolidation.

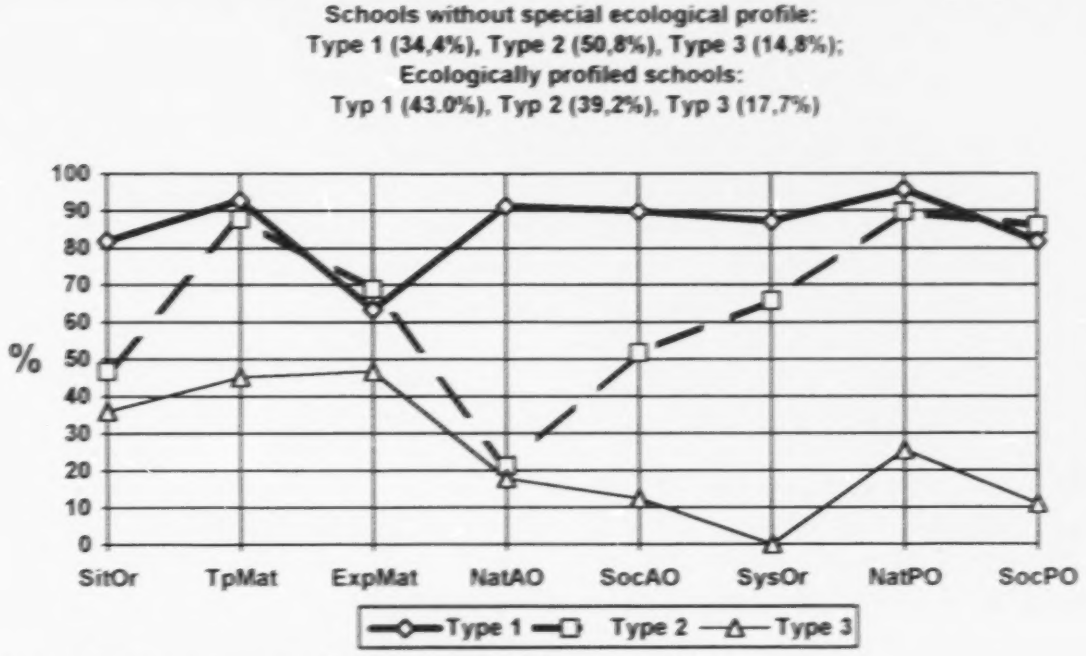

Fig. 4: Treatment types of environmental education, 1996.

The degrees of quality of environmental education conducted by the five populations reviewed in this paper are summed up in table 4.

Population Treatment type	1985	1991 not participating in special programs	1991 participating in special programs	1996 without special ecological profile	1996 ecologically profiled
meets the criteria	15.0%	40.4%	54.5%	34.4%	43.0%
verbal-problem-oriented	46.5%	30.8%	20.0%	50.8%	39.2%
does not meet the criteria	38.5%	28.8%	25.5%	14.8%	17.7%

Table 4: Share of treatment types (latent class membership) in all five populations

A third indicator for the progress in curriculum implementation - especially when considering a cross-subject area such aas environmental education - is the scope of subjects involved. The results show that in 1985 environmental education was primarily concentrated in natural science subjects such as Biology, Chemistry,

Geography, and Physics. Subjects like politics, religion or technics contributed only marginally to environmental education (see fig. 5).

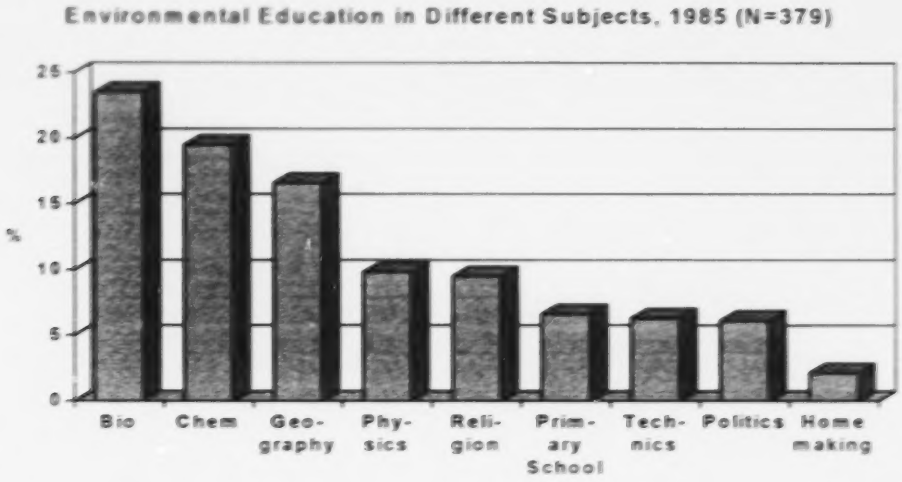

Fig. 5: Environmental education in different subjects (EULEFELD et al., 1988)

In 1991 and 1996, the subjects involved in environmental education were basically the same as in 1985 - with some interesting changes and additions (see fig. 6). As most schools provide similar sets of subjects - independent of their participation in special programs - no distinction is made between the populations of 1991 and 1996.

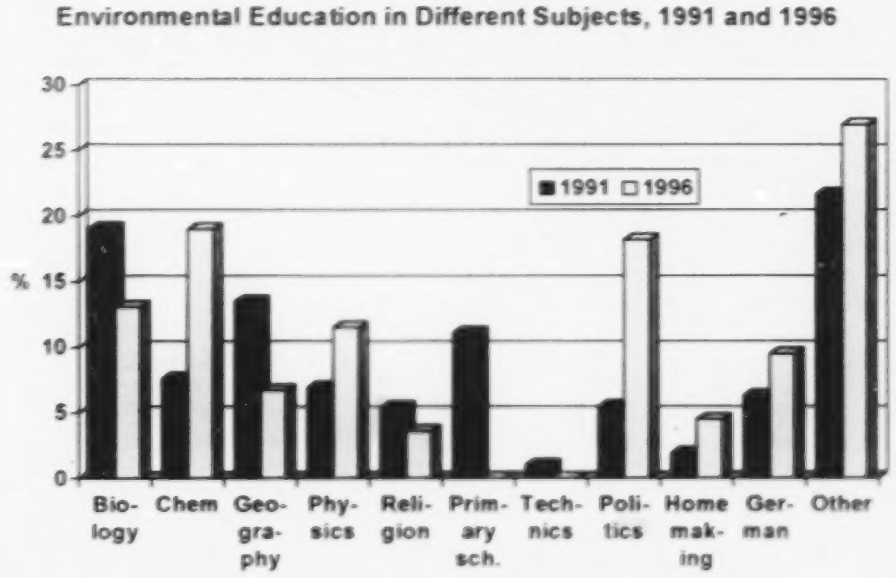

Fig. 6: Environmental education in different subjects, 1991 and 1996

Between 1985 and 1991 the scope of subjects involved in environmental education significantly broadened. This tendency with a shift towards subjects such as social science an German prevailed in 1996. These findings should be interpretated carefully due to different sample structures in 1991 (all grades) and 1996 (9th grade only).

However, the findings from figure 6 are consistent with previously described results. They also depict a consolidation and stabilization in environmental education.

In sum, the results of the data analysis suggest a confirmation of the hypotheses. The results show:

- In 1991, teachers participating in government programs spend more time on environment related classroom activities (an average of 7.5 hours per issue in „normal schools" compared to 9.1 hours per issue in „model schools" participating in government programs).
- When environmental activities are supported by special programs, teachers tend to organize their activities for longer time periods. In 1991, 21.4% of „normal school" teachers teach environmental issues in contiguous periods of one day or more, compared to 39.6% of teachers participating in government programs.
- In 1991, teachers participating in government programs spend more time outside the classroom than their counterparts in schools that do not profit from such programs (4.5 hours compared to 2.5 hours).
- In 1991, teachers at schools participating in government programs meet the requirements of a sound environmental education (action orientation, systems orientation, use of issue specific materials) better than teachers at „normal schools".
- From 1985 to 1991 there are significant increases in overall time spent on environmental issues, and in overall quality of environmental education.
- After 1991, there has been a consolidation and stbilization of environmental education. This reflected by only slight declines of quality and time spent.

These results are consistent with findings of AREGGER (1976) and HAVELOCK (1976) that innovations in schools are characterized by changes in content and organization.

Conclusions

The results reported show that government programs can foster the implementation of new subject areas in curricula and everyday school life - at least in those school that participate in such programs. Further research should address two questions:

1. Governmental programs last for a limited period of time only. How stable are the structures that are established at the time of the program? Can a school that participated in a government program conserve the benefits gained during the period of additional funding and support for the future?
2. Can government programs - limited in time and number of schools able to participate - induce or foster a innovation process that reaches schools that did not participate in the program?

For Germany, both questions can be at least partly answered by the results of the 1996 survey. The answer is positive. Obviously, environmental education has become an

integral part of everyday school life in German schools. The part of special government programs in this process should not be underestimated. When governments pay funds for fostering implementation processes in the school system they can be successful if participants and areas of the programs are carefully selected. Finally, a third research question should be addressed: Does improved and extended environmental education contribute to changes in motivations to act „environmentally friendly" among the students? If possible, this question will be answered on the AERA meeting in 1998. It would also be of interest to learn from the experiences from other countries.

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